



## Laser Analyzer

CRYSTAL RESEARCH  
PRODUCED A PROCESS  
FOR IMPROVING  
THE EFFICIENCY OF  
LASER RODS

**S**cientific Materials Corporation (SM), Bozeman, Montana is a small company with a big reputation in the field of producing laser crystals. Founded in 1982 by Ralph L. Hutcheson, SM's president, a crystal pioneer with almost 40 years experience, the company worked on two NASA Small Business Innovation Research (SBIR) contracts and generated two separate commercial spinoffs, one of them a new company.

Under a Langley Research Center SBIR contract, SM developed a SciMax™ line of improved Nd:YAG crystals for laser and electro-optic applications (Nd:YAG is technical shorthand for the materials involved — neodymium, the dopant, and yttrium aluminum garnet, one of the primary materials used in crystal growing). SM's research provided a process for producing uniform

laser rods in which the amount of water trapped in the crystal during growth is reduced, thereby improving efficiency, and the properties that affect optical quality are also improved for a further gain in crystal efficiency. SM is producing the crystals for such applications as fiber optics, telecommunications, welding, drilling, eye surgery and medical instrumentation.

SM's spinoff company is Montana Analytical Services, which provides a number of special services and supplies for laser engineers and crystal growers. Among those services, SciMax conducts analysis of laser rods for dopant ion concentrations; *below*, analytical chemist Martin K. Schwan is performing an analysis of a rare Earth doped YAG crystal. The techniques used to analyze laser rods were developed under another SBIR

contract with Langley.

Norman Barnes, Langley's technical director for the SM work, termed the development of an analytical service for accurately measuring laser dopant levels a significant advance. "While solid state lasers have been around for 30 years," he wrote, "analysis of the dopant levels has been lacking. Chemical analyses performed by different companies on similar samples typically yield differences of a factor of two." Dopant level analysis is important to the laser system designer because it allows him to model the laser's performance, and it is important to the end user because it allows determination of what went wrong when the laser fails to perform as expected. •

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